

## **Progress Report on *Salmonella* Testing of Raw Meat and Poultry Products, 1998-2004**

The Food Safety and Inspection Service (FSIS) issued the [Pathogen Reduction: Hazard Analysis and Critical Control Point \(HACCP\) Systems; Final Rule on July 25, 1996: Federal Register, Vol. 61, No. 144, pp. 38805-38989](#). To verify that industry Pathogen Reduction/HACCP (PR/HACCP) systems are effective in controlling the contamination of raw meat and poultry products with disease-causing bacteria, the PR/HACCP rule sets *Salmonella* performance standards that slaughter establishments and establishments that produce raw ground products should meet. These product-specific limits on *Salmonella* became effective in large establishments on January 26, 1998, in small establishments on January 25, 1999, and in very small establishments on January 25, 2000. FSIS verifies that establishments are meeting the standards by having federal inspection personnel collect randomly selected product samples and send them to FSIS laboratories for *Salmonella* analysis, according to procedures described in Appendix E of the PR/HACCP final rule: Federal Register, Vol. 61, No. 144, pp. 38917-38928 ([http://www.fsis.usda.gov/OA/fr/haccp\\_rule.htm](http://www.fsis.usda.gov/OA/fr/haccp_rule.htm)).

The *Salmonella* performance standards are based on the prevalence of *Salmonella* as determined from the agency's nationwide microbiological baseline studies ([http://www.fsis.usda.gov/Science/Baseline Data/](http://www.fsis.usda.gov/Science/Baseline%20Data/)) conducted before PR/HACCP was implemented. Raw products currently covered by performance standards are carcasses of cows/bulls, steers/heifers, market hogs, and broilers, and ground beef, ground chicken, and ground turkey. The performance standards are expressed in terms of the maximum number of *Salmonella*-positive samples that are allowed per sample set. The number of samples in a sample set varies by product, and the maximum number of positive samples allowed in a set provides an 80% probability of an establishment passing when it is operating at the standard.

There are two phases of the FSIS regulatory program for *Salmonella* in raw products: non-targeted and targeted testing. Any initial set or any set that follows a passed set is part of the "on-going" or non-targeted testing program. These sets have been designated as "A" sets. Other codes (such as "B", "C", and "D") represent sample sets collected from establishments that are targeted for follow-up testing following a failed set. Non-targeted or "A" sets are collected at establishments randomly selected from the population of eligible establishments that are not currently in the targeted phase of the program, with a goal of scheduling every eligible establishment at least once a year. The scheduling for targeted testing is based on inspection program guidance provided in Chapter 3 of FSIS Directive 5000.1. In establishments producing multiple raw products, FSIS may collect samples from any or all products subject to the performance standard (9 CFR parts 310.25 (b)(2) and 381.94 (b)(2)), so a single establishment may be represented in multiple product class categories.

The data reported here are from the non-targeted regulatory testing program, i.e., results from the code "A" samples. The Agency recognizes that some establishments having the most difficulty in controlling *Salmonella* can be in the targeted testing for an entire year, and are, therefore, not subject to non-targeted testing during that year. Nevertheless, in the absence of continuous baseline studies, the Agency considers the "A" set data to be the best set of data to indicate trends. The regulatory test results are

also compared to the performance standards which were based on [baseline estimates](#) of national *Salmonella* prevalence determined prior to the implementation of PR/HACCP.

FSIS uses data from its regulatory testing program primarily to monitor the effectiveness of HACCP programs in individual establishments. The regulatory testing program was not designed to address specific hypotheses related to change in national product prevalence. Variation among parameters known to affect *Salmonella* contamination (collection season, establishment location) may confound comparisons by year or establishment size. Still, regulatory testing can yield useful data on time- and industry-related trends for *Salmonella* following the implementation of PR/HACCP.

In this report, the data from the non-targeted *Salmonella* testing (“A” sets) for both individual samples and establishment sets are presented by year for the period 2001 – 2004, and in aggregated form for the period 1998 – 2000 ([Table A1](#) and [Table A2](#)). The percent of positive tests in groups stratified by product class and sample year are presented as a percent of the baseline prevalence in [Figure A1](#), and the percentage of sets meeting the performance standard in groups stratified by product class and calendar year are plotted in [Figure A2](#).

The *Salmonella* results for individual samples ([Table A1](#) and [Figure A1](#)) represent samples collected during the calendar year (January 1 to December 31, 2004). Because *Salmonella* test sets ([Table A2](#) and [Figure A2](#)) may extend over a period of weeks or months, set data are reported by the year in which the final sample was collected.

Establishment size information is based on the size status at the end of the calendar year. Beginning with the CY 2002 data, the Agency added a column for “size unknown” because there continued to be a small amount of data that could not be categorized by establishment size. Prior to CY 2002, data for establishments not providing production size information was included in the “very small” category. All CY 2004 data was categorized by establishment size.

In 2004, the percent of positive *Salmonella* tests among samples from non-targeted establishments stratified by product class and establishment size ranged from 0 to 29%. The highest positive rates<sup>1</sup> were noted among poultry products (broiler carcasses, ground chicken and ground turkey) in large, small, and very small establishments. For CY 2004, the percentage of positive “A” set samples decreased for all three beef categories. The non-targeted testing program did not find a single positive in 1,993 beef carcass samples (both steer/heifer and cow/bull) from large establishments. In CY 2004, the percentage of positive samples for market hogs increased from the CY 2003 level of 2.5% up to 3.1% after four consecutive years of declining levels.

For all combinations of product class and establishment size, the percentage of CY 2004 samples positive for *Salmonella* was lower than the baseline prevalence established prior to PR/HACCP implementation. When stratified by product class alone, *Salmonella* positive rates from non-targeted regulatory testing have never exceeded the product class specific baseline estimate over the period 1998 – 2004 with the exception of market hogs in CY 1999 ([Figure A1](#)).

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<sup>1</sup> Defined as greater than or equal to the 75th percentile of percent positive tests for all product/establishment size combinations in 2004.

Of 1,004 “A” sets completed in CY 2004, 956 (95.2%) met the product-specific performance standard. Compliance with product-specific performance standards ranged from 77.8% – 100% when the data was stratified by product class and establishment size.

When FSIS reported the 2003 data, the Agency acknowledged concern that the percentage of positive *Salmonella* tests had increased slightly in all three poultry categories. While the 2004 data show more mixed results, there was a continued increase for young chicken (or broiler) carcasses. FSIS has increased the resources being allocated to comprehensive Food Safety Assessments in establishments displaying negative performance trends and is now considering how best to integrate past performance into the *Salmonella* testing program.

The Agency analyzed a total of 54,750 non-targeted samples in CY 2004 for the seven product categories. Of these, 2,052 (3.7%) were positive. When the results were weighted to account for variations in sampling across product categories, there was not an overall decrease in the percentage of positive samples for CY 2004. This was the first year since HACCP implementation that there had not been an overall decrease in the percentage of positive samples when results are weighted by the proportion of samples collected for each category in 2001.

The presence of *Salmonella* in raw meat and poultry products at the time of inspection is just one factor contributing to the incidence of foodborne salmonellosis. Important strides toward the elimination of this pathogen will be realized when effective interventions are applied to all segments of the food production and distribution chain, including animal and plant husbandry, production, transportation, and preparation.

Achieving a reduction in pathogens reduces the risk of illness. However, all segments of the food-production chain and consumers should continue to properly handle, cook, and store all meat, poultry, and other food products in order to guard against foodborne disease.

**For More Information:**

- Media – (202) 720-9113
- Congressional – (202) 720-3897
- Constituent – (202) 720-9113
- Consumer inquiries – Call USDA’s Meat and Poultry Hotline at 1-888-MPHotline (1-888-674-6854). The TTY number is 1-800-256-7072.
- Technical inquiries – Director, Microbiology Division, Office of Public Health Science, (202) 690-6369.
- FSIS Web Site: <http://www.fsis.usda.gov>

**Table A1**  
**Percent Positive *Salmonella* Tests in the PR/HACCP Verification Testing**  
**Program by Product Class and Calendar Year, 1998 - 2004**

**"A" Set Samples**

		CY 2004									
Product	Baseline Prevalence (%)	Large		Small		Very Small		Unknown		All Sizes	
		# Samp	% Pos	# Samp	% Pos	# Samp	% Pos	# Samp	% Pos	# Samp	% Pos
Broilers	20.0	5,023	11.7%	1,871	18.2%	178	17.4%	0		7,072	13.5%
Market Hog	8.7	1,274	2.2%	1,989	4.8%	4,597	2.7%	0		7,860	3.1%
Cows/Bulls	2.7	522	0.0%	1,801	0.6%	852	1.5%	0		3,175	0.8%
Steer/Heif	1.0	1,471	0.0%	1,287	0.3%	1,469	0.5%	0		4,227	0.3%
Grd Beef	7.5	840	2.4%	15,336	2.0%	14,808	1.2%	0		30,984	1.6%
Grd Chick	44.6	53	5.7%	254	29.1%	81	27.2%	0		388	25.5%
Grd Turkey	49.9	835	20.7%	177	19.2%	32	3.1%	0		1,044	19.9%

		CY 2003									
Product	Baseline Prevalence (%)	Large		Small		Very Small		Unknown		All Sizes	
		# Samp	% Pos	# Samp	% Pos	# Samp	% Pos	# Samp	% Pos	# Samp	% Pos
Broilers	20.0	4,730	12.2%	1,672	14.5%	66	16.7%	0		6,468	12.8%
Market Hog	8.7	1,423	2.5%	1,186	4.2%	3,315	2.0%	0		5,924	2.5%
Cows/Bulls	2.7	310	0.0%	1,368	1.2%	921	2.4%	0		2,599	1.5%
Steer/Heif	1.0	1,107	0.2%	1,336	0.6%	2,037	0.4%	0		4,480	0.4%
Grd Beef	7.5	1,106	2.7%	13,677	2.1%	14,228	1.2%	86	9.3%	29,097	1.7%
Grd Chick	44.6	53	3.8%	206	45.6%	37	24.3%	0		296	35.5%
Grd Turkey	49.9	785	29.9%	124	10.5%	95	7.4%	0		1,004	25.4%

		CY 2002									
Product	Baseline Prevalence (%)	Large		Small		Very Small		Unknown		All Sizes	
		# Samp	% Pos	# Samp	% Pos	# Samp	% Pos	# Samp	% Pos	# Samp	% Pos
Broilers	20.0	6,247	10.9%	2,673	13.2%	263	8.4%	0		9,183	11.5%
Market Hog	8.7	1,639	2.5%	1,717	3.9%	4,015	3.2%	108	0.9%	7,479	3.2%
Cows/Bulls	2.7	547	0.5%	2,506	1.4%	1,361	2.5%	0		4,414	1.7%
Steer/Heif	1.0	1,775	0.2%	1,045	0.9%	1,735	0.1%	17	0.0%	4,572	0.3%
Grd Beef	7.5	740	2.8%	16,979	3.2%	13,187	1.7%	27	0.0%	30,933	2.6%
Grd Chick	44.6	106	23.6%	323	31.0%	0		0		429	29.1%
Grd Turkey	49.9	746	17.4%	289	18.3%	40	22.5%	0		1,075	17.9%

		CY 2001							
Product	Baseline Prevalence (%)	Large		Small		Very Small		All Sizes	
		# Samp	% Pos	# Samp	% Pos	# Samp	% Pos	# Samp	% Pos
Broilers	20.0	5,879	9.7%	2,684	13.0%	392	37.2%	8,955	11.9%
Market Hog	8.7	1,419	1.6%	1,385	3.5%	5,286	4.4%	8,090	3.8%
Cows/Bulls	2.7	72	0.0%	1,045	1.3%	1,059	3.7%	2,176	2.4%
Steer/Heif	1.0	58	0.0%	411	0.2%	1,226	0.8%	1,695	0.6%
Grd Beef	7.5	691	3.6%	11,749	3.5%	11,803	2.1%	24,243	2.8%
Grd Chick	44.6	90	26.7%	131	16.8%	41	12.2%	262	19.5%
Grd Turkey	49.9	313	25.2%	144	27.1%	63	28.6%	520	26.2%

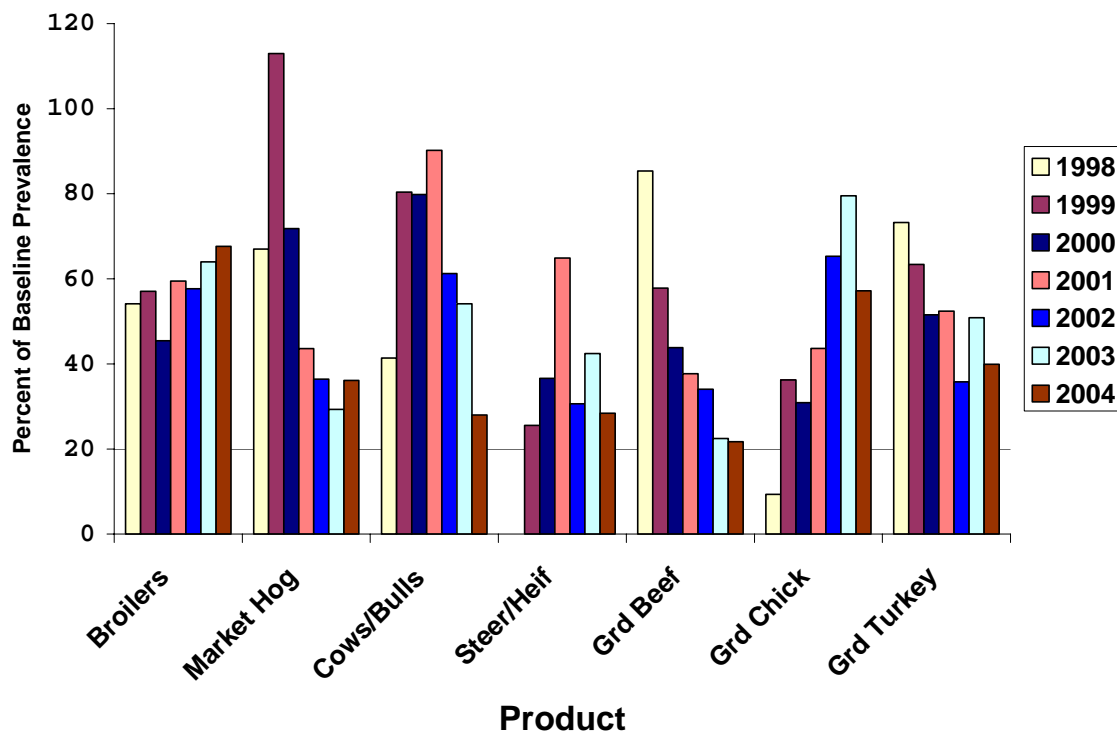
		CY 1998 - 2000							
Product	Baseline Prevalence (%)	Large		Small		Very Small		All Sizes	
		# Samp	% Pos	# Samp	% Pos	# Samp	% Pos	# Samp	% Pos
Broilers	20.0	17,350	9.1%	5,073	14.1%	61	18.0%	22,484	10.2%
Market Hog	8.7	4,282	4.1%	3,094	10.9%	1,107	7.2%	8,483	7.0%
Cows/Bulls	2.7	347	0.6%	3,119	2.2%	229	3.5%	3,695	2.1%
Steer/Heif	1.0	708	0.1%	1,203	0.4%	177	0.0%	2,088	0.3%
Grd Beef	7.5	3,263	5.5%	36,846	3.8%	10,406	2.7%	50,515	3.7%
Grd Chick	44.6	318	12.9%	405	15.8%	12	8.3%	735	14.4%
Grd Turkey	49.9	2,523	30.8%	668	25.3%	1	0.0%	3,192	29.7%

		All Years 1998 - 2004							
Product	Baseline Prevalence (%)	Large		Small		Very Small		Unknown	All Sizes
		# Samp	% Pos	# Samp	% Pos	# Samp	% Pos	# Samp % Pos	# Samp % Pos
Broilers	20.0	39,229	10.2%	13,973	14.3%	960	23.0%	0	54,162 11.5%
Market Hog	8.7	10,037	3.0%	9,371	6.4%	18,320	3.4%	108 0.9%	37,836 4.1%
Cows/Bulls	2.7	1,798	0.3%	9,839	1.5%	4,422	2.6%	0	16,059 1.7%
Steer/Heif	1.0	5,119	0.1%	5,282	0.5%	6,644	0.4%	17 0.0%	17,062 0.4%
Grd Beef	7.5	6,640	4.2%	94,587	3.1%	64,432	1.7%	113 7.1%	165,772 2.6%
Grd Chick	44.6	620	15.3%	1,319	26.8%	171	21.6%	0	2,110 23.0%
Grd Turkey	49.9	5,202	26.8%	1,402	22.0%	231	15.2%	0	6,835 25.4%

Figure A1

Comparison of Percent Positive *Salmonella* Tests in the PR/HACCP Verification Testing Program with Baseline Prevalence, by Product Class and Calendar Year, 1998 - 2004\*

"A" Set Samples



\* Bars represent percent positive *Salmonella* tests divided by product-specific baseline *Salmonella* prevalence.

Table A2

Percent of Sample Sets Meeting the *Salmonella* Performance Standards \*  
By Calendar Year, 1998 - 2004

## "A" Sets

	CY 2004														
	Large			Small			Very Small			Unknown		All Sizes			
Product	#	Sets	% Pass	#	Sets	% Pass	#	Sets	% Pass	#	Sets	% Pass	#	Sets	% Pass
Broilers	106		94.3%	36		77.8%	2		100.0%	0			144		90.3%
Market Hog	25		96.0%	35		85.7%	70		92.9%	0			130		91.5%
Cows/Bulls	9		100.0%	36		97.2%	16		81.3%	0			61		93.4%
Steer/Heif	24		100.0%	19		94.7%	29		96.6%	0			72		97.2%
Grd Beef	16		93.8%	287		97.6%	268		97.0%	0			571		97.2%
Grd Chick	1		100.0%	3		100.0%	1		100.0%	0			5		100.0%
Grd Turkey	18		94.4%	3		100.0%	0			0			21		95.2%

	CY 2003													
	Large			Small		Very Small		Unknown		All Sizes				
Product	#	Sets	% Pass	#	Sets	% Pass	#	Sets	% Pass	#	Sets	% Pass		
Broilers	94		88.3%	33		81.8%	0			127		86.6%		
Market Hog	27		100.0%	24		87.5%	58		98.3%	0		109		96.3%
Cows/Bulls	6		100.0%	24		91.7%	15		80.0%	0		45		88.9%
Steer/Heif	11		100.0%	10		100.0%	19		94.7%	0		40		97.5%
Grd Beef	21		95.2%	261		97.7%	263		98.9%	1	0.0%	546		98.0%
Grd Chick	1		100.0%	3		66.7%	0			0		4		75.0%
Grd Turkey	11		100.0%	3		100.0%	2		100.0%	0		16		100.0%

	CY 2002														
	Large			Small			Very Small			Unknown		All Sizes			
Product	#	Sets	% Pass	#	Sets	% Pass	#	Sets	% Pass	#	Sets	% Pass	#	Sets	% Pass
Broilers	124		90.3%	54		87.0%	8		62.5%	0			186		88.2%
Market Hog	30		100.0%	33		100.0%	95		93.7%	1		100.0%	159		96.2%
Cows/Bulls	9		88.9%	42		85.7%	17		76.5%	0			68		83.8%
Steer/Heif	18		100.0%	11		90.9%	13		76.9%	0			42		90.5%
Grd Beef	14		92.9%	354		92.7%	262		97.7%	2		100.0%	632		94.8%
Grd Chick	2		100.0%	6		83.3%	0			0			8		87.5%
Grd Turkey	14		100.0%	4		100.0%	0			0			18		100.0%

	CY 2001							
	Large		Small		Very Small		All Sizes	
Product	#	Sets % Pass	#	Sets % Pass	#	Sets % Pass	#	Sets % Pass
Broilers	117	94.0%	49	89.8%	4	25.0%	170	91.2%
Market Hog	25	96.0%	23	91.3%	49	77.6%	97	85.6%
Cows/Bulls	2	100.0%	15	93.3%	17	76.5%	34	85.3%
Steer/Heif	1	100.0%	8	100.0%	4	100.0%	13	100.0%
Grd Beef	13	92.3%	200	94.0%	213	97.2%	426	95.5%
Grd Chick	1	100.0%	4	100.0%	1	100.0%	6	100.0%
Grd Turkey	9	88.9%	6	100.0%	1	100.0%	16	93.8%

	CY 1998 - 2000							
	Large		Small		Very Small		All Sizes	
Product	#	Sets % Pass	#	Sets % Pass	#	Sets % Pass	#	Sets % Pass
Broilers	325	93.2%	93	81.7%	0		418	90.7%
Market Hog	74	90.5%	46	65.2%	0		120	80.8%
Cows/Bulls	5	100.0%	47	80.9%	0		52	82.7%
Steer/Heif	7	100.0%	11	90.9%	0		18	94.4%
Grd Beef	57	84.2%	596	89.9%	75	90.7%	728	89.6%
Grd Chick	5	100.0%	5	100.0%	0		10	100.0%
Grd Turkey	40	92.5%	7	71.4%	0		47	89.4%

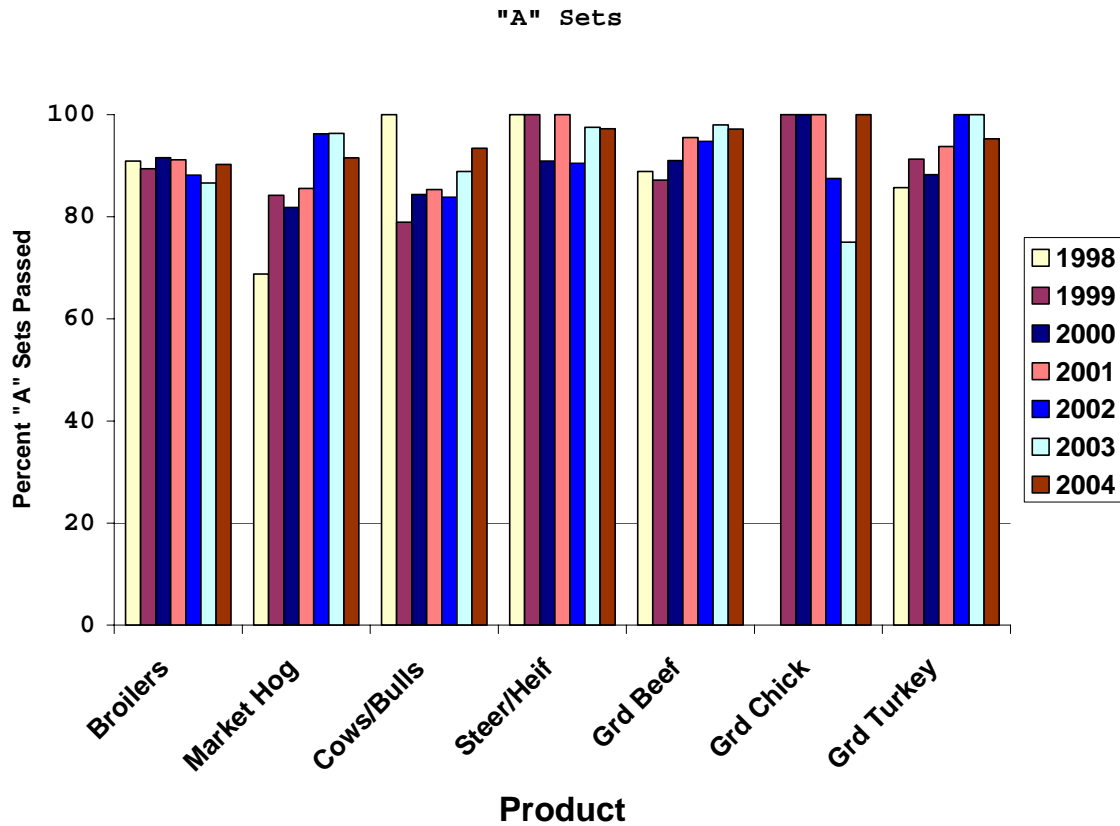
	All Years 1998 - 2004							
	Large		Small		Very Small		Unknown	All Sizes
Product	#	Sets % Pass	#	Sets % Pass	#	Sets % Pass	# Sets % Pass	# Sets % Pass
Broilers	766	92.4%	265	83.8%	14	57.1%	0	1,045 89.8%
Market Hog	181	95.0%	161	83.9%	272	91.5%	1 100.0%	615 90.6%
Cows/Bulls	31	96.8%	164	88.4%	65	78.5%	0	260 86.9%
Steer/Heif	61	100.0%	59	94.9%	65	92.3%	0	185 95.7%
Grd Beef	121	89.3%	1,698	93.5%	1,081	97.2%	3 66.7%	2,903 94.7%
Grd Chick	10	100.0%	21	90.5%	2	100.0%	0	33 93.9%
Grd Turkey	92	94.6%	23	91.3%	3	100.0%	0	118 94.1%

\* Includes sample sets that completed during the indicated calendar year  
(sample sets may have started during an earlier year).



Figure A2

Overall Percentages of Sample Sets Meeting *Salmonella* Performance  
Standards \*  
By Calendar Year, 1998 - 2004



\* Includes sample sets from establishments of all sizes that completed during the indicated calendar year (sets may have started during an earlier year).